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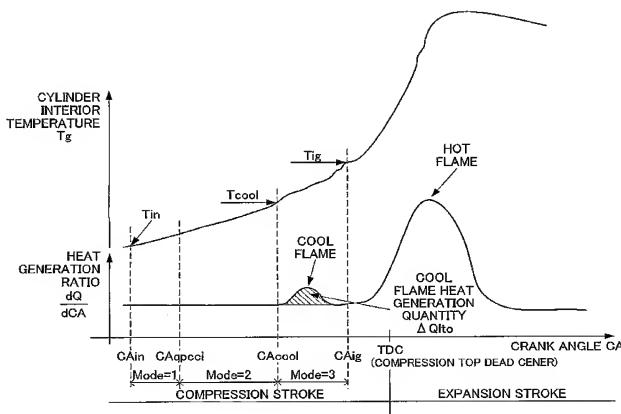
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(54) Title: GAS-MIXTURE-IGNITION-TIME ESTIMATION APPARATUS FOR INTERNAL COMBUSTION ENGINE AND CONTROL APPARATUS FOR INTERNAL COMBUSTION ENGINE



(57) Abstract: A gas-mixture-ignition-time estimation apparatus for an internal combustion engine estimates the temperature of a premixed gas mixture for PCCI combustion (i.e., cylinder interior temperature  $T_g$ ), while relating it to the crank angle  $CA$ , on the basis of a state quantity of the cylinder interior gas at the time of start of compression ( $CA_{in}$ ) (heat energy of the cylinder interior gas at the time of start of compression), the amount of a change in the state quantity of the cylinder interior gas attributable to compression in a compression stroke (minute piston work), and the heat generation quantity of a cool flame generated in PCCI combustion prior to autoignition (hot flame) (cool flame heat generation quantity  $\Delta Q_{lto}$ ). A time when the cylinder interior temperature  $T_g$  reaches a predetermined autoignition start temperature  $T_{ig}$  is estimated as an autoignition start time ( $CA_{ig}$ ) of the premixed gas mixture related to PCCI combustion. Since the cool flame heat generation quantity  $\Delta Q_{lto}$  is taken into consideration, the autoignition start time related to PCCI combustion can be estimated accurately.

WO 2005/090768 A1



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